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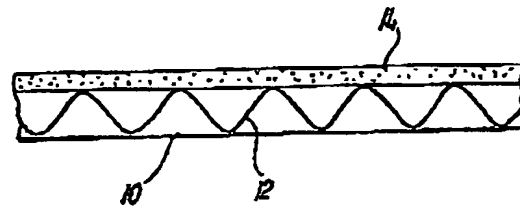
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Swindell & Pearson, 44 Frier Gate, Derby DE1 1DA(51) INT. CL.⁴
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(54) Corrugated paper-form laminates

(57) A corrugated paper product includes a paper layer 10 and an expanded plastics layer 14 with a corrugated paper layer 12 sandwiched therebetween.

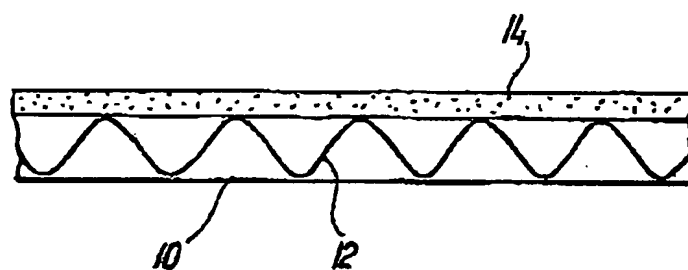


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SPECIFICATION

Improvements in or relating to corrugated paper products

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The present invention concerns improvements in or relating to corrugated paper products.

In the present invention the term "paper" is intended to embrace within its scope any paper substance.

According to the present invention there is provided a corrugated paper product comprising a paper sheet, a sheet of expanded plastics material extending substantially parallel to the paper sheet, and an intermediate layer of corrugated paper interposed between the paper and plastics sheets and fixed thereto.

Preferably the crests of the corrugations of the intermediate layer are affixed by adhesive to the paper and expanded plastics material sheets.

Preferably the adhesive fixing the intermediate layer to the paper sheet is a water-based starch adhesive which is activated by the application of heat thereto.

Preferably the adhesive fixing the intermediate layer to the expanded plastics material sheet is a cold set adhesive.

Preferably the expanded plastics material of the sheet is polystyrene.

Further according to the present invention there is provided a method of manufacturing a corrugated paper product comprising bringing a layer of corrugated paper into contact with a sheet of paper and fixing the corrugated layer thereto by adhesive, thereafter presenting to the exposed face of a corrugated layer a sheet of expanded plastics material and fixing said layer to the corrugated layer by adhesive.

Preferably the adhesive for fixing the paper sheet to the corrugated layer is a water-based starch adhesive which is set by the application of heat supplied, for example, by way of rollers over which the paper sheet and layer are passed.

Preferably the adhesive applied to the corrugated layer to fix the expanded plastics material layer thereto is cold setting adhesive.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawing, which shows diagrammatically a longitudinal cross-section through a corrugated paper product.

A corrugated paper product intended especially but not exclusively for use in the manufacture of insulated packages, comprises a first sheet of paper 10 to which is attached by normal gluing methods using a heat activated water-based starch adhesive a corrugated paper layer 12 the layer having been formed utilising any suitable method. An expanded plastics material sheet 14, for example of polystyrene or polyurethane, is fixed to the crests of the corrugations on the opposite side of the corrugated layer 12 from the paper sheet 10. As the application of heat would detrimentally affect the plastics sheet it is fixed to the crests of the corrugations by a cold setting adhesive.

The thickness of the plastics material layer can vary but conveniently is of the order of 3mm.

The method of manufacturing the product is to form, by utilising standard machinery and techniques, a single face corrugated board comprising the sheet 10 and the corrugated layer 12 in web form. Thereafter the expanded plastics layer is applied to the exposed crests of the single face board on which adhesive has been spread, the plastics sheet being held in position by a roller or series of rollers while the adhesive sets.

Various modifications can be made without departing from the scope of the invention, for example an additional paper sheet may be interposed between the corrugated layer and the expanded plastics material sheet. Additionally, a protective sheet could be provided on the external surface of the expanded plastics sheet.

In a further modification the paper sheet 10 could be replaced by a further expanded plastics sheet. The corrugated layer may take any convenient form, for example it may be a waffle layer, but preferably, as shown in the drawing, it is a normal transversely fluted corrugated paper sheet.

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CLAIMS

1. A corrugated paper product comprising a paper sheet, a sheet of expanded plastics material extending substantially parallel to the paper sheet, and an intermediate layer of corrugated paper interposed between the paper and plastics sheets and fixed thereto.

2. A product as claimed in claim 1, in which the crests of the corrugations of the intermediate layer are affixed by adhesive to the paper and expanded plastics material sheets.

3. A product as claimed in claim 2, in which the adhesive fixing the intermediate layer to the paper sheet is a water/ based starch adhesive which is activated by the application of heat thereto.

4. A product as claimed in claim 2, in which the adhesive fixing the intermediate layer to the expanded plastics material sheet is a cold set adhesive.

5. A product as claimed in any of claims 1 to 4, in which the expanded plastics material of the sheet is polystyrene.

6. A method of manufacturing a corrugated paper product comprising bringing a layer of corrugated paper into contact with a sheet of paper and fixing the corrugated layer thereto by adhesive, thereafter presenting to the exposed face of a corrugated layer a sheet of expanded plastics material and fixing said layer to the corrugated layer by adhesive.

7. A method as claimed in claim 6, in which the adhesive for fixing the paper sheet to the corrugated layer is a water-based starch adhesive which is set by the application of heat supplied by way of rollers over which the paper sheet and layer are passed.

8. A method as claimed in claim 6, in which the adhesive applied to the corrugated layer to fix the expanded plastics material layer thereto is cold

setting adhesive.

9. A corrugated paper product substantially as hereinbefore described with reference to the accompanying drawing.

5 10. A method of manufacturing a corrugated paper product substantially as hereinbefore described with reference to the accompanying drawing.

11. Any novel subject matter or combination including novel subject matter disclosed in the foregoing specification or claims and/or shown in the drawings, whether or not within the scope of or relating to the same invention as any of the preceding claims.

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claim 3, wherein the corrugated partition plate includes wave patterns with different frequencies.

12. The sound-absorbing unit as claimed in
5 claim 3, wherein the corrugated partition plate includes wave patterns with different amplitudes.

13 (amended). A sound-absorbing unit
comprising:

10 a partition plate having a plurality of recesses formed in a first side thereof, each of said recesses having an opening with a predetermined shape on the first side; and

15 a sound-absorbing material provided on the first side of the partition plate to cover the openings of the recesses,

wherein each of the recesses has a cross-sectional area that gradually varies with a depth of the recess.

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14 (canceled).

15. The sound-absorbing unit as claimed in
claims 3 or 13, wherein the thickness of air spaces behind
25 the sound-absorbing material is set to odd multiples of one-fourth of the wavelength of sound waves of target frequencies..